



RECORDING MEDIA DISCARD DEVICE, RECORDING MEDIA
DISCARD SYSTEM, AND CONTENTS ADMINISTRATION METHOD

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to a recording media discard device for discarding a recording medium and a system including the device, and a contents administration method.

10 Related Background Art

In a conventional printing system, for example, print data generated by a personal computer or the like is sent to a printer, whereby given contents can be printed. Such print system is capable of sharing
15 electronic information contents through network connection.

However, when contents are once printed on paper used as a display medium, it is difficult to share or administer paper information because the
20 paper information is separated from the network.

In addition, concerning conversion of paper information into an electronic form, Japanese Patent Application Laid-Open No. 2000-285203 discloses an information transmission method using paper
25 incorporating an IC chip. This method also stores information, which is printed on paper, in the IC chip attached to the paper. Then, in the case in

The attached application:

U.S. Application No.: 10/795,316

Filing Date: 3/9/04

Group Art Unit: 2876

which the same information is printed on different paper, the information stored in the IC chip is read out and printed, whereby the information is distributed, exchanged, and saved using the paper as
5 an electronic storage medium.

Further, as a printed matter publication control system, Japanese Patent Application Laid-Open No. H11-78176 discloses a technique concerning a system for preventing publication of an illegitimate
10 printed matter. This system is used for, for example, publication control for printed matters such as securities and copyrighted articles. With this system, only in the case in which identification information on a display medium is recognized as
15 legitimate identification information, contents stored in a contents controlling apparatus are printed on the display medium. Thus, prints having the legitimate identification information can be administered. Here, as "identification information",
20 for example, print information such as characters and signs, magnetic information, optical detection information such as a barcode, a watermark, and the like are disclosed.

Moreover, Japanese Patent Application Laid-Open
25 No. 2002-120475 discloses, as a document management system, a technique which allows easy grasp of a person in charge, a place of approval, and the like

together with search, consultation via circular, circulation, and the like of a document by using a document including a sheet attached with an identifier. The laid-open patent application also
5 indicates that contents, which are printed on the sheet attached with an identifier, and the identifier of the sheet, on which the contents are printed, are administered in association with each other, and discloses a shredder incorporated with a reading
10 device as an office machine for discarding the sheet attached with the identifier which is used as a display medium.

In a general conventional use/administration system for paper documents, paper used as a display
15 medium, on which contents are printed or copied, is separated from a network system. Thus, it is practically impossible to administer prints.

In addition, Japanese Patent Application Laid-Open No. 2000-285203 described above simply discloses
20 a technique for storing contents in an IC chip and a technique for reading out and printing the contents stored in the IC chip but does not disclose a description concerning administration in the case where the paper with an IC chip is discarded.

25 Further, Japanese Patent Application Laid-Open No. H11-78176 described above discloses a system for administering contents printed on a display medium

but does not disclose a description concerning administration in the case where the display medium is discarded.

Moreover, in the document management system disclosed in Japanese Patent Application Laid-Open No. 2002-120475, when the sheet attached with an identifier is discarded by a shredder, the shredder reads the identifier, whereby it can be confirmed that the sheet with the identifier has been discarded. However, in Japanese Patent Application Laid-Open No. 2002-120475, even if a sheet is discarded, contents printed on the discarded sheet remains in a management device.

In addition, this system is a system for administering existence and discard of a sheet and cannot prevent a user from discarding an important document by mistake.

SUMMARY OF THE INVENTION

It is an object of the present invention to solve the problems of the conventional techniques described above.

It is another object of the present invention to perform administration of contents itself printed on a recording medium such as a sheet on the basis of discard of the recording medium.

It is a still another object of the present

invention to prevent contents from being discarded by mistake.

Other objects of the present invention will be apparent from the following descriptions and the
5 drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a structure of a contents sharing system which uses a display
10 medium with an RF-ID tag in accordance with a first embodiment of the present invention;

Fig. 2 is a flowchart of a discard process of a display media discard device in the contents sharing system which uses the display medium with an RF-ID
15 tag in accordance with the first embodiment of the present invention;

Fig. 3 is a block diagram showing a structure of a contents sharing system which uses a display medium with an RF-ID tag in accordance with a second
20 embodiment of the present invention; and

Fig. 4 is a flowchart of an RF-ID tag separation and discard process of a display media discard device in a contents sharing system which uses a display medium with an RF-ID tag in accordance
25 with a third embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will be hereinafter described with reference to the accompanying drawings.

First embodiment

5 First, a first embodiment of the present invention will be described with reference to Figs. 1 and 2.

Fig. 1 is a block diagram showing a structure of a contents sharing system using a display medium with an RF-ID tag in accordance with the first
10 embodiment of the present invention. In the figure, reference numeral 100 denotes a display medium with an RF-ID tag; 101, a network; 102, a display media discard device (a display media discard device
15 including in an RF-ID reader); and 103, a data administration device. The display media discard device 102 and the data administration device 103 are connected to the network 101.

Here, the display medium with an RF-ID tag 100
20 is a display medium in which an RF-ID tag, which is capable of communicating identification information (e.g., an ID number) incorporated in an IC chip to an RF-ID read unit 106 serving as an RF-ID reader
according to a radio system, is fixed to a front
25 surface or a rear surface of a display medium by adhesion or the like so as not to come off, inserted in the display medium, or formed so as to be

sandwiched by two or more display media. In addition, the display medium may be any printable sheet-like display medium such as general plain paper, paper with a coated surface, photographic paper such as a photograph, thermal paper, diazo sensitized paper, a
5 PET film for an overhead projector, or a resin film of polyethylene, plastics, or the like.

The display media discard device 102 includes a network interface (I/F) 104, a control unit 105, an
10 RF-ID read unit 106, a display medium discard unit 107, a memory unit 108, and a manipulation unit 109. The data administration device 103 includes a network interface (I/F) 110, a data storage unit 111, and a data administration unit 112.

15 The display medium with RF-ID tag 100 and the display media discard device 102 perform data communication by radio between the RF-ID read unit 106 and the RF-ID tag.

The network interface 104 is an interface for
20 performing data communication via a communication line. An IP address is allocated to the display media discard device 102, and is identified on the network 101. The control unit 105 controls reading of an RF-ID, printing, data communication, data
25 display, data storage, and the like and performs overall function control of the display media discard device 102. The RF-ID read unit 106 is a unit for

reading identification information of the RF-ID tag,
which is attached to the display medium with an RF-ID
tag 100, according to a radio system. The RF-ID read
unit 106 includes a processor unit for performing
5 control and data processing, an RF unit for
performing modulation of transmission data and coding
of reception data, and an antenna unit for performing
RF communication with the RF-ID tag.

Any system, which discards the display medium
10 with an RF-ID tag 100 such that contents on the
medium cannot be recognized, such as cutting or
melting for making the contents unreadable is
applicable to the display media discard unit 102.
The display media discard unit 102 may have a
15 function for discarding the display medium with an
RF-ID tag 100 after the RF-ID tag is separated.

The memory unit 108 is used for temporarily
storing upon confirmation of information,
identification information, contents information
20 concerning the identification information,
administration information related to the contents
information, and the like to realize a high degree of
security.

The manipulation unit 109 is a human interface
25 for performing print instruction and has a display
portion and an input portion. Specifically, the
display portion may be a display which can display at

least information related to contents or a display with a touch panel having a digitizer, with which input can be performed, formed on a surface thereof. Alternatively, the display portion may show a

5 processing state with simple lighting display of a light-emitting diode (LED). In this display portion, contents information related to identification information, administration information related to the contents information, and the like are displayed.

10 Confirmation information on discard of a display medium is also displayed. In addition, the input portion may be a manipulation button, voice input, or the like instead of the touch panel. Further, it is also possible that, as the display medium with an RF-

15 ID tag 100 is placed in a predetermined position of the display media discard device 102, the display media discard device 102 automatically recognizes the display medium with an RF-ID tag 100 to issue a discard order for the display medium with an RF-ID

20 tag 100. It is also possible that, even in the case in which the RF-ID read unit 106 has detected an RF-ID of the display medium with an RF-ID tag 100, the display media discard device 102 automatically recognizes the display medium with an RF-ID tag 100

25 according to a detection signal of the RF-ID read unit 106 to instruct inquiry about contents.

The display media discard device 102 may

include an optical reading function, a data storage unit, and a data administration unit in addition to the above-mentioned functions. In addition, the display media discard device 102 may be integrated
5 with a computer or may incorporate a computer.

The data administration device includes the network interface (I/F) 110, the data storage unit 111, and data administration unit 112.

The network interface 110 is an interface for
10 performing data communication via a communication line. An IP address is allocated to the data administration device 103, and is identified on the network 101.

The data storage unit 111 includes a database
15 of identification information for RF-ID tags allowed to be used and a database including registered identification information, contents information related to the identification information, and administration information related to the contents
20 information.

The database of identification information for RF-ID tags allowed to be used is registered and updated at any time via the network 101 at a point when the display medium with an RF-ID tag 100, which
25 is usable in the system of the present invention, is put on the market. Consequently, it becomes possible to use a display medium for which security is

guaranteed, and security administration of a print of contents can be performed.

The registered identification information is an ID number of an RF-ID tag which is registered when contents are printed on the display medium with an RF-ID tag 100. The contents information related to identification information means information printed on the display medium with an RF-ID tag 100. The contents information sometimes means contents information which is not printed on the display medium with an RF-ID tag 100 but is stored in association with identification information of the display medium with an RF-ID tag 100. In other words, only on the display medium with an RF-ID tag 100, a part of contents information is printed and formed, and information related to the contents information is stored. It is possible to access and print this information when it is necessary. In addition, in the case in which the contents information has been changed, the contents information before the change and the contents information after the change may be stored in association with each other.

The administration information related to the contents information consists of at least information added to contents, information added to printing, related identification information, and security information. The information added to contents is

information on a creator of contents, software used for creating the contents, date and time of the creation, a computer used for creating the contents, and the like. The information added to printing is
5 information on date and time of printing, a printer used for the printing, a range of printing, print options, a model of the printer, a version of a printer driver, a print property, and the like. The related identification information is an ID number of
10 an RF-ID tag which is attached to a display medium on which identical contents are printed, an ID number of an RF-ID tag attached to a display medium on which a corrected version of identical contents information is printed, and the like.

15 When a display medium is discarded by the display media discard device 102, if it is instructed to add administration information related to the contents information or to delete the contents information, the series of information is also
20 deleted. The security information of the display medium with an RF-ID tag 100 is information on permission of access to contents, that is, information related to browsing, change, printing, and the like of the contents.

25 The data administration unit 112 performs data storage control processing such as new registration, addition registration, correction registration,

deletion, and the like of data stored in the data storage unit 111, control of data communication via the network 101, update of the database of identification information for RF-ID tags allowed to
5 be used, and the like.

Fig. 2 is a flowchart of a discard process in the respective units of the display media discard device 102 in the contents sharing system which uses the display medium with an RF-ID tag in accordance
10 with this embodiment.

Fig. 2 will be hereinafter described.

First, the display medium with an RF-ID tag 100 is placed in a predetermined position of the display media discard device 102. The display media discard
15 device 102 issues a discard command for a display medium from the manipulation unit 109 to start discard work (step S200). In the beginning, the display media discard device 102 reads out identification information of an RF-ID (step S201),
20 and confirms whether or not the identification information is registered in the data administration device 103 of the present system (step S202). Then, if the identification information is not registered in the data administration device 103, the display
25 media discard device 102 indicates its the display portion that the display medium is not registered. Then, the display media discard device 102 performs

display for confirmation on whether or not discard of the display medium is executed, and a user chooses whether discard is to be executed or aborted (step S203). The display media discard device 102

5 processes the display medium according to a result of the choice (steps S206 and S208).

In addition, in the case in which the identification information is registered in the data administration device 103, the display media discard
10 device 102 displays, for example, a part of administration information of contents related to the identification information on the display portion and alerts confirmation on whether or not discard of the display medium is executed (step S204). The user
15 chooses whether discard is executed or aborted (step S205), and the display media discard device 102 processes the display medium according to a result of the choice (steps S207 and S208).

In the case in which the display medium with an
20 RF-ID tag 100 is discarded in this way, in the display media discard device 102, it is also possible to delete a group of data related to the identification information (which consists of, for example, ID numbers and contents information related
25 to the ID numbers, and contents administration information) stored in the data administration device 103. Therefore, the display media discard device 102

displays an inquiry about whether or not data related to the contents information on the discarded display medium is to be left on the data administration device 103. On the basis of the contents on the display, the user can choose whether or not the data related to the contents information on the discarded display medium is to be left on the data administration device 103 (step S209). Then, if the data is to be left, in the data administration device 103, the display media discard device 102 additionally registers the fact of discard, date and time of discard, a name of the device, and other conditions in the administration information related to the identification information (step S210). In addition, in the case in which the data is to be deleted, the display media discard device 102 deletes the contents information related to the identification information, the administration information, and the like from the data administration device 103 (step S211). In addition, regardless of whether or not the data is deleted, the display media discard device 102 adds the fact that the display medium has been discarded in contents administration information of other identification information associated with the identification information.

After the above-mentioned steps are finished,

the discard process of Fig. 2 ends (step S212).

The contents sharing system using the display medium with an RF-ID tag in accordance with this embodiment is appropriate for administration of a
5 print document for an individual, administration of a print such as an important document with high confidentiality when the print is distributed to plural persons, and the like. In particular, the contents sharing system is suitable for
10 administration of a confidential document in a company.

In addition, the contents sharing system using the display medium with an RF-ID tag in accordance with this embodiment is also effective for a purpose
15 of preventing illegitimate printing, copying, falsification, and the like. The contents sharing system is suitable for administration of securities, official documents, contracts, applications, certificates, medical sheets, receipts, admission
20 tickets, copyrighted articles (novels, paintings, posters, picture postcards), membership cards, electronic document output for a government, photographs, and the like.

In this embodiment, after a display medium is
25 discarded, the display media discard device 102 confirms whether or not data on the display medium is to be left in the data administration device 103, and

the data is processed in the data administration device 103. However, the discard process of the display medium and the deletion of the data from the data administration device 103 may be performed
5 simultaneously or may be performed in the opposite order.

By using the display media discard device 102 in the contents sharing system using the display medium with an RF-ID tag in accordance with this
10 embodiment, it has become possible to delete and administer both display medium (paper) information and digital information.

In short, in this embodiment, an RF-ID tag is attached to a display medium to associate
15 identification information with contents printed on the display medium, and contents information corresponding to the identification information and administration information related to the contents information are administered in the data
20 administration device 103 connected to the network 101. Consequently, the display medium is discarded in the display media discard device 102 connected to the network 101 to rewrite the administration information related to the contents information,
25 whereby administration of the display medium has become possible. In addition, it has become possible to discard the contents using the display media

discard device 102. As a result, sharing of contents has become possible under administration excellent in security.

Second embodiment

5 Next, a second embodiment of the present invention will be described with reference to Fig. 3.

Fig. 3 is a block diagram showing a structure of a contents sharing system using a display medium with an RF-ID tag in accordance with the second
10 embodiment of the present invention. In the figure, components identical with those in Fig. 1 of the first embodiment described above are denoted by the identical reference numerals and signs.

In this embodiment, plural display media
15 discard devices (display media discard devices each including an RF-ID reader) 102a and 102b and plural data administration devices 103a and 103b are connected to the network 101. The devices are connected in IP addresses different from each other.

20 In Fig. 3, as a part of the devices, two display media discard devices and two data administration devices are illustrated.

Contents in accordance with this embodiment are stored on the data administration devices 103a and
25 103b as a data group consisting of ID information, contents information, and administration information related to the contents information.

In this embodiment, when this data group is stored in the data storage unit 111, information indicating on which IP address the data group is stored is added, and the data administration devices 5 103a and 103b sometimes share and update a data table consisting of ID numbers and IP addresses serving as identification information, whereby security is realized.

This function closely resembles a function 10 carried out by a DNS server in the Internet. Although this function is performed by the data administration devices 103a and 103b, an administration device may be set separately according to a size of the network 101.

15 In this embodiment, the data group consisting of identification information, contents information, and administration information related to the contents information is usually stored on the basis of an order of the data administration devices 103a 20 and 103b, which is entirely optimized, because of factors such as an organization form and an installation location.

In this embodiment, the display media discard devices 102a and 102b, which are connected to the 25 network 101 and connected to every possible places, are used, whereby it has become possible to make use of the contents sharing system.

Third embodiment

Next, a third embodiment of the present invention will be described with reference to Fig. 4.

Note that, since a basic structure of a contents sharing system in accordance with this embodiment is identical with that of the first embodiment described above, Fig. 1 is applied to the following description.

This embodiment is different from the first embodiment in that the display media discard device 102 is provided with a separation and recycle function for an RF-ID tag. The separation and recycle function for an RF-ID tag makes the display media discard device 102 effective in recycling.

Note that since processing for changing or deleting information, which is administered by the data administration device 103, at the time of discard of a display medium is the same as the processing shown in Fig. 2, the processing won't be described here.

Fig. 4 is a flowchart of a separation and discard process for an RF-ID tag of the display media discard device 102 in the contents sharing system in accordance with this embodiment.

When a discard command for the display medium with an RF-ID tag 100 is issued (step S401), first, the display media discard device 102 separates an RF-ID tag from the display medium with the RF-ID tag 100

(step S402) and recycles the RF-ID tag (step S403).

The RF-ID tag consists of an IC chip and an antenna. Since the RF-ID tag adheres to the display medium with an RF-ID tag 100, the RF-ID tag is
5 separated from the display medium 100 by cutting an RF-ID tag portion from the display medium 100. The remaining display medium after the separation of the RF-ID tag portion is cut such that contents displayed thereon cannot be read and is then discarded (step
10 S404). The discarded display medium is recycled (step S405). In addition, it is also possible to remove an IC chip portion from the recycled RF-ID tag by melting or the like and recycle the IC chip portion.

15 According to this embodiment, recycle of the display medium with an RF-ID tag can be facilitated.

The various examples and embodiments of the present invention have been described. However, those skilled in the art will understand that the
20 spirit and scope of the present invention are not limited to the specific descriptions and drawings in this specification but can cover various alterations and modifications which are described in claims.

Examples of aspects of the present invention
25 will be hereinafter described.

A first aspect of the present invention is a system including a display media discard device which

has a function for discarding a display medium with
an RF-ID tag and a function for reading
identification information of the RF-ID tag by radio
communication; and a data administration device which
5 stores contents information and administration
information related to the contents information in
association with the identification information of
the RF-ID tag, the system being characterized by
including administration information rewriting means
10 which, when the display medium is discarded in the
display media discard device, rewrites administration
information related to the contents information
stored in the data administration device.

According to the first aspect, administration
15 of the display medium can be performed.

A second aspect of the present invention is a
system as described in the first aspect,
characterized in that, when the display medium is
discarded in the display media discard device, it is
20 possible to discard the contents information stored
in the data administration device.

According to the second aspect, since contents
information stored in the data administration device
can be discarded using the display media discard
25 device, deletion processing of unnecessary data can
be performed easily without requiring manipulation
from a separate computer, server, or the like.

A third aspect of the present invention is a system as described in the first aspect, characterized in that plural data administration devices and plural display media discard devices are
5 connected via a network, which allows all data groups consisting of the contents information stored in the respective data administration devices, administration information related to the contents information, and ID information of the RF-ID to be
10 shared, and allows access to all the data groups in the respective display media discard devices.

According to the third aspect, even in the case in which a size of the system is increased and plural data administration devices and plural display media
15 discard devices are connected on a network, the system of the present invention can be realized. More specifically, for example, the system can be realized by providing a function for sharing an IP address of the data administration device, which
20 stores therein an ID number which is Id information and contents information of data with the ID number, and the like at any time like in the case of the Internet where IP addresses are shared in DNS servers. Alternatively, the system can be realized by
25 separately providing a server such as a DNS server which administers an IP address of the data administration device which stores therein an Id

number and contents information.

According to the third aspect, contents can be shared with a high degree of security in any places throughout the world connected via the Internet if
5 the display media discard device of the present invention is connected.

A fourth aspect of the present invention is a display media discard device having a function for discarding a display medium with an RF-ID tag,
10 characterized by including: identification information reading means for reading identification information of the RF-ID tag by with radio communication; display means for displaying administration information or the like related to
15 contents information corresponding to the identification information read by the identification information reading means; and means for performing processing for discarding the display medium with the RF-ID tag, from which the identification information
20 is read, and rewriting the administration information of the contents information related to the identification information in accordance with an instruction form a user.

According to the fourth aspect, when a user
25 discards a display medium, since the user can confirm whether or not the display medium may be discarded, the display medium can be prevented from being

discarded by mistake. In addition, since the display media discard device confirms that the display medium has been discarded and then sends discard information to the data administration device, it is possible to
5 thoroughly perform administration related to the contents of the display medium.

A fifth aspect of the present invention is a display media discard device according to the fourth aspect, characterized by further including separation
10 and recycling means which separates and recycles the RF-ID tag attached on the display medium in the display media discard device.

In particular, separation by type and recycle of paper used as a display medium will be a more
15 important process in future. In a display medium with an RF-ID tag, it is necessary to remove the RF-ID tag when the display medium is separated by type and recycled. According to the fifth aspect, a position of the RF-ID tag in the display medium is
20 determined in advance, whereby it becomes possible to remove that part of the RF-ID tag and recycle the other part of the display medium.

As described above, according to the present invention, information, which are administered in
25 relation to the display medium can be changed and deleted on the basis of discard processing of the display medium and, for example, a discard history

and the like of contents information printed on the display medium can be administered. Therefore, contents administration can be performed in an environment with a high degree of security. In
5 addition, a print of the contents which requires a caution on security for the user can be administered easily and strictly.

Further, important contents can be prevented from being discarded by mistake using identification
10 information of the display medium.

WHAT IS CLAIMED IS:

1. A recording media discard system,
comprising:

administering means for administering
5 identification information of a recording medium and
contents information outputted to the recording
medium in association with each other;

discarding means for discarding the recording
medium; and

10 deleting means for deleting the contents
information, which is administered in association
with the identification information of the recording
medium, in accordance with the discard of the
recording medium by the discarding means.

15

2. A recording media discard system according
to claim 1, further comprising choosing means for
choosing whether or not the contents information,
which is administered in association with the
20 identification information of the discarded recording
medium, is to be deleted in accordance with the
discard of the recording medium by the discarding
means,

wherein the deleting means deletes the contents
25 information based on the choice made by the choosing
means.

3. A recording media discard system according to claim 2, further comprising changing means for changing administration information, which is administered by the administering means, without
5 deleting the contents information based on the choice made by the choosing means.

4. A recording media discard system according to claim 1, wherein the deleting means deletes the
10 contents information based on the identification information of the recording medium.

5. A recording media discard system according to claim 1, further comprising recycling means for
15 recycling identification information transmission means attached to the recording medium when the recording medium is discarded by the discarding means.

6. A recording media discard device,
20 comprising:

discarding means for discarding a recording medium; and

deleting means which performs processing for deleting contents information, which is administered
25 in association with identification information of the recording medium, in accordance with the discard of the recording medium by the discarding means.

7. A recording media discard device according to claim 6, further comprising choosing means for choosing whether or not the contents information, which is administered in association with the
5 identification information of the discarded recording medium, is to be deleted in accordance with the discard of the recording medium by the discarding means,

wherein the deleting means performs processing
10 for deleting the contents information based on the choice made by the choosing means.

8. A recording media discard device according to claim 7, further comprising changing means which
15 performs processing for changing administration information, which is administered by the administering means, without deleting the contents information based on the choice made by the choosing means.

20

9. A recording media discard device according to claim 6, wherein the deleting means performs processing for deleting the contents information based on the identification information of the
25 recording medium.

10. A recording media discard device according

to claim 6, further comprising recycling means for recycling identification information transmission means attached to the recording medium when the recording medium is discarded by the discarding means.

5

11. A contents administration method,
comprising:

a discarding step of discarding a recording
medium; and

10 a deleting step of performing processing for
deleting contents information, which is administered
in association with identification information of the
recording medium, in accordance with the discard of
the recording medium by the discarding means.

15

ABSTRACT OF THE DISCLOSURE

The present invention provides a system which includes: a display media discard device which has a discard unit for discarding a display medium with an
5 RF-ID tag and an RF-ID read unit for reading identification information of the RF-ID tag by radio communication; and a data administration device which stores contents information and administration information related to the contents information in
10 association with the identification information of the RF-ID tag. In the system, when the display medium is discarded in the display media discard device, the contents information stored in the data
15 administration device is deleted or the administration information is rewritten.

FIG. 1

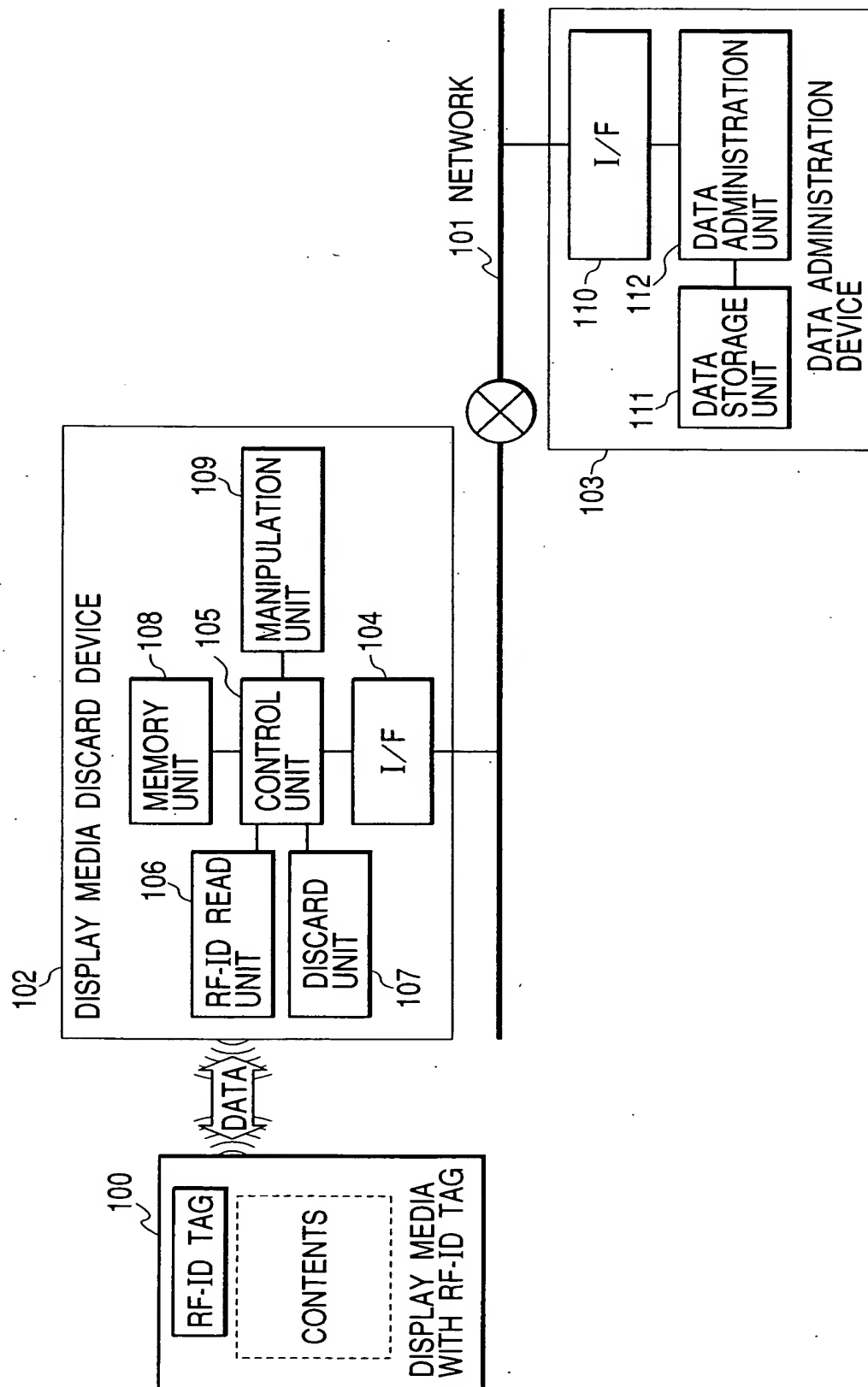


FIG. 2

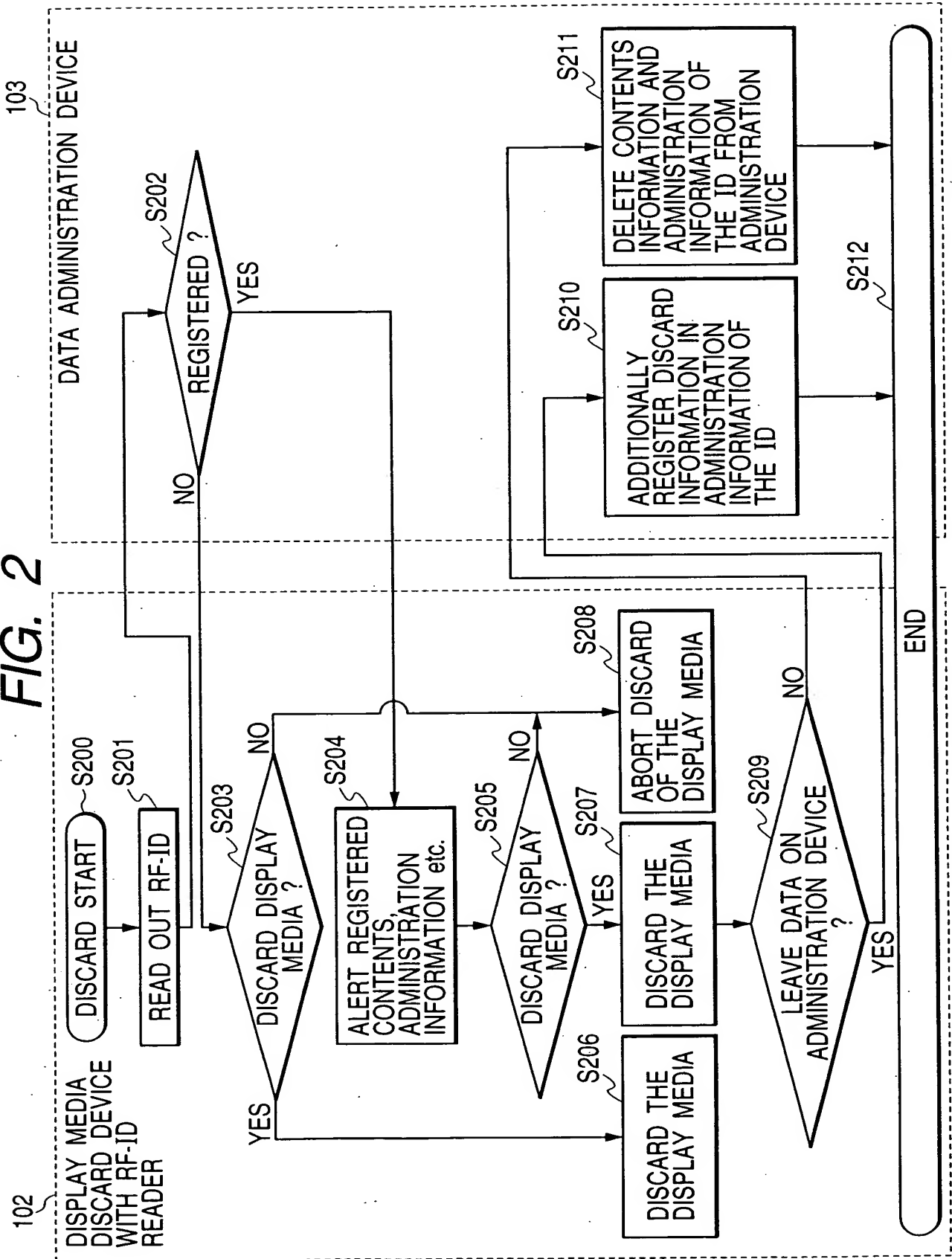


FIG. 3

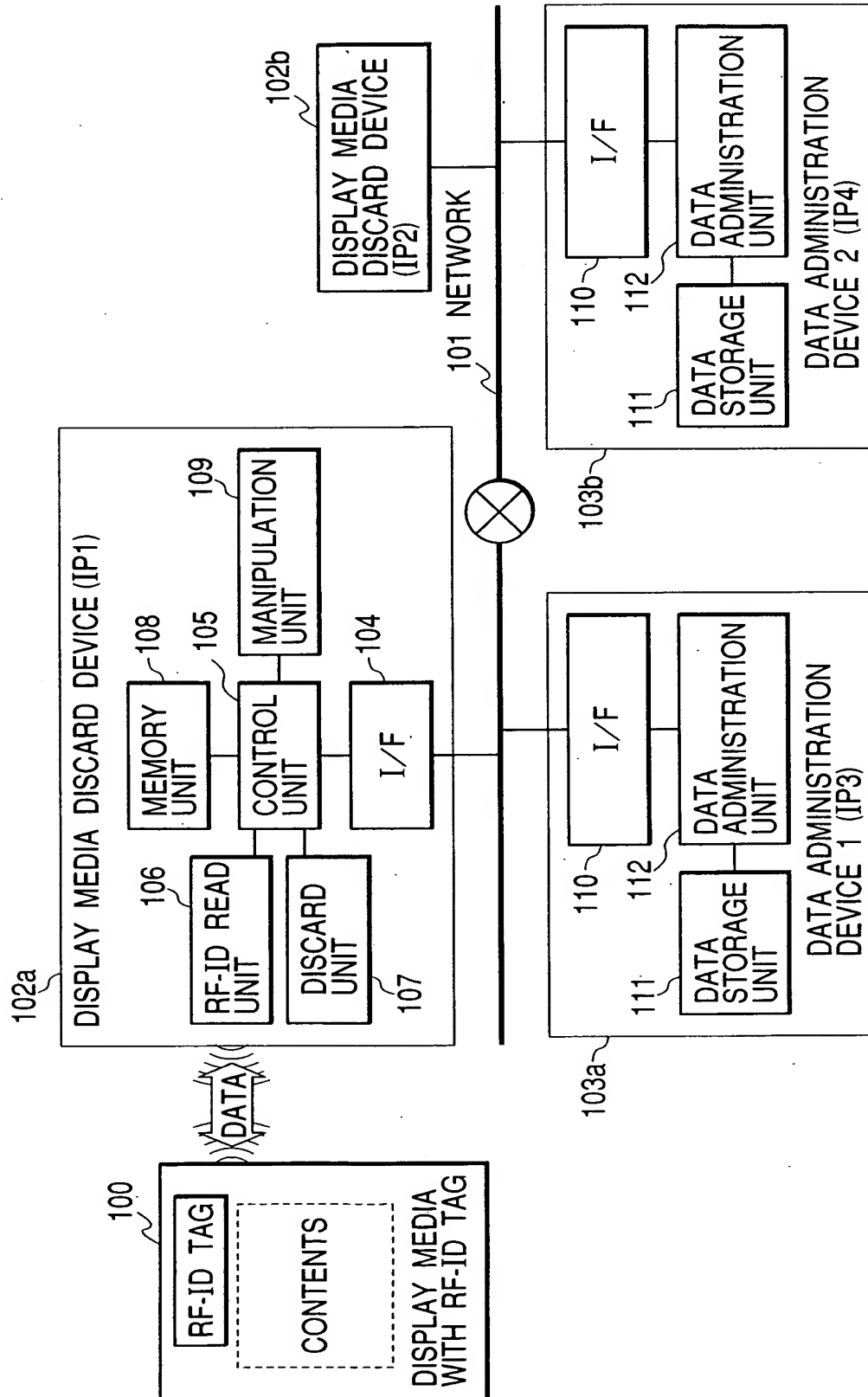


FIG. 4